

(12) **United States Patent**
Stephens et al.

(10) **Patent No.:** **US 6,303,882 B1**
(45) Date of Patent: **Oct. 16, 2001**

(54) **LOAD CELL APPARATUS AND METHOD**

(75) **Inventors:** **Thomas W. Stephens, Leander; Donald R. Zrudsky, Liberty Hill, both of TX (US)**

(73) **Assignee:** **Cranlum Corporation, Austin, TX (US)**

(*) **Notice:** Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

4,037,469	7/1977	Nordstrom et al.	177/147
4,102,295	7/1978	Crook, Jr. et al.	177/147
4,114,709 *	9/1978	Jacobs et al.	177/156
4,153,123	5/1979	Berezyiat	177/147
4,379,495	4/1983	Cocks et al.	177/1
4,455,880	6/1984	Naslund	73/862.56
4,523,653 *	6/1985	Scrivener et al.	177/147
4,553,619	11/1985	Fujinaga	177/185
4,596,297	6/1986	Skibinski	177/132
4,697,798 *	10/1987	Pitter et al.	73/862.56
4,932,253	6/1990	McCoy	73/151
5,152,183	10/1992	Munzebrock	73/862.56
5,264,666	11/1993	English et al.	177/147
5,429,007	7/1995	Khachaturian et al.	73/862.474

* cited by examiner

(21) **Appl. No.:** **09/523,385**

(22) **Filed:** **Mar. 10, 2000**

(51) **Int. Cl.⁷** **C01G 19/14; B66C 1/40**

(52) **U.S. Cl.** **177/147; 177/184; 73/862.56**

(58) **Field of Search** **177/147, 184, 177/185, 186, 187, 188, 189, 154, 155, 156, 157, 158, 159; 73/862.56**

(56) **References Cited**

U.S. PATENT DOCUMENTS

2,616,683	11/1952	LeFevre, Jr.	177/147
3,229,778	1/1966	Schaner	177/147
3,290,931	12/1966	Fowkes et al.	177/147
3,315,202 *	4/1967	Johns et al.	177/147
3,556,237	1/1971	Allison	177/147
3,823,395	7/1974	Rigney et al.	320/267 C
3,827,514	8/1974	Bradley	177/147
3,911,737	10/1975	Ormond	73/141 A

Primary Examiner—Randy W. Gibson

(74) **Attorney, Agent, or Firm**—J. Nevin Shaffer, Jr.; Shaffer & Culbertson, LLP

(57) **ABSTRACT**

A load cell system (10) having a frame (12) to which upper compliance assembly (14) is connected. A load cell (16) is connected to upper compliance assembly (14) and lower compliance assembly (18) is connected to load cell (16). In preferred embodiments, load cell system (10) includes fixed overload limit (26), moving overload limit (28), and anti-rotation device (24). In a still further embodiment, load cell system (10) includes a data transmission and receiver device (65) for transmitting and receiving data to and from load cell (16).

20 Claims, 8 Drawing Sheets

